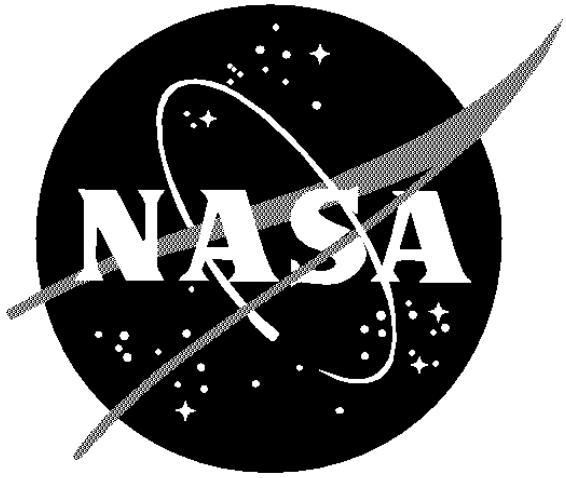

National Aeronautics and Space Administration

January 5, 1998

NRA-98-MTPE-01

RESEARCH ANNOUNCEMENT

OPPORTUNITIES FOR HYDROMETEOROLOGICAL PARTICIPATION IN THE LARGE-SCALE BIOSPHERE-ATMOSPHERE EXPERIMENT IN AMAZONIA (LBA)

Step 1 proposals due February 23, 1998
Step 2 proposals due May 1, 1998

OMB Approval No. 2700-0087

OPPORTUNITIES FOR HYDROMETEOROLOGICAL PARTICIPATION IN THE LARGE-SCALE BIOSPHERE-ATMOSPHERE EXPERIMENT IN AMAZONIA (LBA)

NASA Research Announcement
98-MTPE-01

Issued January 5, 1998
Step 1 proposals due February 23, 1998
Step 2 proposals due May 1, 1998

Office of Mission to Planet Earth
National Aeronautics and Space Administration
Washington, DC 20546

I. Programmatic Background – NASA/MTPE

NASA's Mission to Planet Earth (MTPE) enterprise endeavors to understand the total Earth system and the effects of natural and human-induced changes on the global environment. The Science Division of the Office of Mission to Planet Earth supports research and analysis that would promote and increase the use of remotely sensed information for detecting and evaluating environmental status and change at both regional and global scales. In support of the research goals of the US Global Change Research Program (GCRP; *http://www.gcrio.org*) and of other national and international research programs, five interdisciplinary science themes that have reached sufficient maturity and hold the greatest promise of practical, near-term societal benefit have been identified for focused research in the context of longer-term goals of the Science Division; these themes are:

- Seasonal-to-interannual climate variability and prediction
- Long-term climate: natural variability and change
- Atmospheric ozone research
- Land-cover change and land-use change research
- Natural hazards research and applications

There are important hydrologic and hydrometeorological aspects to all themes except atmospheric ozone research. The Land Surface Hydrology Program, one of 17 disciplinary programs in the Science Division (*http://www.hq.nasa.gov/office/mtpe/draftsciplan/mtpe-srp.htm*), has the goal of developing a predictive understanding of the role of water in land-atmosphere interactions, and to further the scientific basis of water resources management. The Land Surface Hydrology Program currently consists of four elements:

a) Observational and modeling studies designed to understand large-scale soil moisture dynamics. Included are methods for describing the heterogeneity of soils, vegetation, and precipitation, as well as the role of topography, use of remote sensing techniques for surface soil moisture, and development and application of data assimilation techniques to incorporate soil moisture observations (in situ and remotely sensed) into coupled land-atmosphere models;

b) Support for development of regional coupled land-atmosphere models for water resources planning and management, and as tools for improving the performance of global models with respect to prediction of seasonal to interannual variability;

c) Development of techniques for monitoring changes in surface hydroclimatology due to changes in land cover and land use using remote sensing measurements and operational environmental data; and

d) participation in field and numerical experiments designed to improve the coupling of physical, biological, and chemical processes.

II Programmatic Background -- LBA

The Large-Scale Biosphere-Atmosphere Experiment in Amazonia (LBA) is an international research initiative, lead by Brazil, designed to create the new knowledge needed to understand the climatological, ecological, biogeochemical, and hydrological functioning of Amazonia, as well as the impact of land use change on these functions, and the interactions between Amazonia and the earth system. LBA is centered around two science questions that integrate the physical, chemical, biological, and human sciences:

1) How does Amazonia currently function as a regional entity?

2) How will changes in land use and climate affect the biological, chemical, and physical functions of Amazonia, including the sustainability of development in the region and the influence of Amazonia on global climate?

The emphasis of LBA will be on observations and analyses which will enlarge the knowledge base in Amazonia in six general areas:

- Physical Climate
- Carbon Storage and Exchange
- Biogeochemistry
- Atmospheric Chemistry
- Land Surface Hydrology and Water Chemistry
- Land Use and Land Cover.

The program is designed to address major issues raised by the Rio Climate Convention, specifically it will provide the basis for producing an inventory (terrestrial sources and sinks) of greenhouse gases in Amazonia. It will also help provide the basis for sustainable land use in Amazonia, using data and analysis to define the present state of the system and its response to perturbations, complemented by modeling, to provide insight into possible changes in the future.

III. Purpose and focus of this NRA

This NRA (98-MTPE-01) is specifically directed at hydrometeorological participation in the Large-Scale Biosphere-Atmosphere Experiment in Amazonia (LBA). LBA (science plan available from (http://yabae.cptec.inpe.br/lba/conciseplan/cp.html) has strong links to all of the MTPE interdisciplinary science themes outlined in Section I, but from a hydrometeorological standpoint the most relevant are seasonal-to-interannual prediction, land use/land cover change, and natural hazards. The hydrometeorological aspects of LBA have direct ties not only to the Land Surface Hydrology program, but also to several other disciplinary programs, including Atmospheric Dynamics and Remote Sensing, Global Modeling and Analysis, Global Data Integration and Validation, Radiation, and Terrestrial Ecology.

The emphasis of NASA-funded LBA hydrometeorological research (LBA/NH) is on issues that:

a) are amenable to understanding and prediction by application of remotely sensed observation;

b) are important at length scales from mesoscale to continental scale; and

c) are important at time scales from days to interannual.

These issues are central to Physical Climate and Land Surface Hydrology aspects of LBA, as identified in the LBA Science Plan. By working in close collaboration with parallel European-funded hydrometeorological actvities (LBA/EH; see http://www.ce.washington.edu/~hydro/Lettenmaier/CurrentResearch.html) the LBA/NH program seeks to answer the following scientific questions:

- *What are the surface and meteorological controls on the fluxes of energy and water, and how do they vary both in space, over Amazonia, and in time, between seasons and from year to year, to affect the regional budgets of energy and water?*

- *What are the mesoscale mechanisms by which differences in surface characteristics translate into large scale weather and climate anomalies?*

- *What is the role of dry and moist convection in transferring energy and how will it change with different land use patterns?*

- *How is the rainfall of Amazonia controlled by the large scale land-surface atmosphere interactions? Which areas within Amazonia have the most influence on rainfall and how does this vary with time?*

- *What is the relative importance of Amazonia in generating its own climate compared to the role of external planetary scale forcing, and conversely what is the influence of Amazonia on global climate?*

- *How will the climate of Amazonia change in response to changes in land use and global climate forcing?*

- *What would be the response in the volume and timing of flow in the River Amazon to the changes in climate, particularly rainfall and evaporation, as predicted by General Circulation Models, or which may occur as a result of large scale change in land use?*

- *What are the spatial and temporal pattern of surface and sub-surface water storage and flux in the soils and river corridors of the Amazon Basin, and how are they influenced by variations in climate and land use?*

- *What are the characteristics of soil moisture and river flow for mesoscale basins and how can they be predicted?.*

The goal of LBA/NH is to contribute to the understanding of the hydrological cycle in a region which is a major modulator of the hemispheric climate. Working closely with

LBA/EH, LBA/NH will emphasize the use of surface, aircraft, and spaceborne remote sensing capabilities to define the basin scale precipitation and water fluxes in order to examine how the basin functions as a regional entity. Remote sensing measurements will be integrated with the in-situ measurement program in order to understand the links between the atmospheric and land hydrology, sources and sinks of water, the role of the basin in driving the inter-annual climate oscillation, and to help understand the impacts of anthropogenic influences on the basin water and carbon cycle.

Projects solicited under this NRA will complement the NASA Ecology and Chemistry aspects of the experiment (solicited under NRA-97-MTPE-02, available from http://www.hq.nasa.gov/office/mtpe/nra97mtpe02/nra9702.html) and will work closely with the Land Validation phase of the Tropical Rain Measuring Mission (TRMM) (http://mentor.eorc.nasda.go.jp/TRMM; see also http://trmm.gsfc.nasa.gov/trmm_office/index.html).

The program of NASA-sponsored research covered in this announcement is intended to study the effects of tropical forest conversion and includes hydrometeorological research in LBA. Significant portions of the proposed research will be conducted within the territory of Brazil. The conduct of research activities sponsored by this announcement within the territory of Brazil is subject to and contingent upon approval(s) for such research activities by appropriate elements of the Brazilian Government. This NRA is being issued and proposals are being requested prior to the receipt of formal endorsement of and approval by the Brazilian Government of these proposed research activities. NASA is confident that the necessary Brazilian Government approvals will be obtained. However, NASA provides notice to all prospective offerors and potential investigators seeking to submit proposals pursuant to this announcement, that NASA reserves the right to make no selections and no awards for those research activities that do not receive endorsement and approval from the Brazilian Government. Subject only to the appropriation of funds, NASA intends to make selections and awards for those research activities which do not require approval of the Brazilian Government, as well as for those research activities that receive endorsement and approval from the Brazilian Government.

IV. Guidance for proposers

A. Technical information and instructions for proposers

Appendix A provides technical information concerning the four priority topics for which proposals are sought under this NRA. Also included in Appendix A is the amendatory guidance for proposers that are specific to this solicitation. *Please note that this solicitation involves two stages: Step 1 requires brief, summary proposals and Step 2 requires full proposals. Also note that the amendatory guidance shall be used wherever conflicts exist with the general instructions for responding to NASA Research Announcements which are included in Appendix B.* Appendix C contains instructions for foreign participation in this opportunity. The proposal cover page is provided in Appendix D. The institutional certifications required for full proposals are included in Appendix E.

B. Eligibility

Participation in this solicitation is open to all categories of domestic and foreign organizations, including institutions of higher education, industry, non-profit organizations, NASA centers, and other government agencies. With regard to proposals from US government research laboratories, civil service salary costs are not reimbursable.

Participation by non-US scientists is encouraged within the guidelines described in Appendix C, which include a no-exchange-of-funds provision.

C. Proposal submission and schedule

Proposals submitted in response to this NRA will be subjected to peer review utilizing either mail or panel evaluation, or both. A NASA management review of technical and logistical feasibility and cost analysis will also be conducted. Step 1 proposals should include a cover page (institutional authorizing signatures not required) and up to 5 pages of text, single-spaced, with type no smaller than 12-pt., including abstracts and references. Proposers will be notified by NASA regarding its review of Step 1 proposals in four rating categories: *1) high priority, 2) medium priority, 3) low priority, and 4) non-responsive or inappropriate*. All Step 1 proposers are eligible to respond with full Step 2 proposals; however, full proposals from the Step 1 proposals rated in categories 3 or 4 are discouraged. Full proposals furnished with institutional authorizing signatures should adhere to the format and page limitations given in Appendix A. The schedule is:

Step 1 proposals due by 5 p.m., EDT, February 23, 1998
Notification of Step 1 recommendations: by March 13, 1998
Step 2 proposals due by 5 p.m., EDT, May 1, 1998
Announcement of selections: by July 1, 1998

Submit proposals to:

Identifier: NRA 98-MTPE-01
Land Surface Hydrology
Code Y
400 Virginia Avenue, SW, Suite 700
Washington, DC 20024
Telephone: 202/554-2775

Copies required: 10

Submit one additional copy of foreign proposals to:

NASA Headquarters
Office of External Relations
Mission to Planet Earth Division
Mail Code IY
300 E Street, SW
Washington, DC 20546-0001

Selecting official: Director, Science Division
Office of Mission to Planet Earth

Inquiries: Dr. Dennis Lettenmaier
Mail Code YS
NASA Headquarters
300 E Street, SW

Washington, DC 20546-0001
TEL: 202/358-1847
FAX: 202/358-2771
Email: dennis.lettenmaier@hq.nasa.gov

Your interest and cooperation in participating in this opportunity are appreciated.

William F. Townsend
Acting Associate Administrator for
Mission to Planet Earth

Enclosures:

Appendix A, Technical Information on Research Sought under NRA 98-MTPE-01 and Amendatory Guidance for Proposers
Appendix B, Instructions for Responding to NASA Research Announcements
Appendix C, Guidelines for Foreign Participation
Appendix D, Proposal Cover Page
Appendix E, Required Certifications

APPENDIX A

Technical Information on Research Sought under NRA 98-MTPE-01 and Amendatory Guidance for Proposers

This appendix provides background technical information regarding the research topics to be supported under this NRA. Section I describes the four priority topics. The content and evaluation of Step 1 proposals are discussed in Section II. The format and evaluation of full proposals for Step 2 are discussed in Section III. The guidelines below shall be used wherever conflicts exist with the general instructions for responding to NASA Research Announcements given in Appendix B.

I. PRIORITY TOPICS

Proposals are sought which address one or more of the following priority topics:

Priority Topic 1: Global scale hydrometeorology:

1.1 utilize model experiments to assess the influence of the parameterization of land surface and land-related atmospheric processes on regional, continental, and/or global scale, seasonal-to-interannual predictability in the Amazon River basin;
1.2 develop and/or test experimental seasonal-to-interannual predictions which exploit improved parameterizations of land surface and land-related atmospheric processes, as well as improved data assimilation methods and remote sensing algorithms produced in connection with LBA and related experiments (such as TRMM);
1.3 utilize LBA data to evaluate land surface parameterizations, and their implications for global climate and weather forecast models.

Priority Topic 2: Continental and regional scale hydrometeorology:

2.1 estimate the surface hydrological and energy budgets at regional and/or continental scales in terms of their distinct components: precipitation, vegetation and vegetation interception reservoirs, soil moisture storage, evaporation and stream flow; surface radiation budget and energy transfers and storage;
2.2 model and predict the surface hydrological and energy budgets of the LBA region on times scales from diurnal to interannual, and evaluate predictions using observations and/or analysis fields;
2.3 develop and test remote sensing algorithms for estimation of land surface moisture and energy fluxes, and state variables (e.g., canopy and soil moisture storage; canopy and surface temperature) in tropical forest regions;
2.4 develop and test improved methods for assimilating remotely sensed and *in situ* measurements into regional and global scale models, and their application to document regional scale energy and water cycles, especially in the context of improving initiation of seasonal-to-interannual predictions;
2.5 provide otherwise missing atmospheric and surface data that are critical to provide adequate documentation of regional and continental scale energy and water cycles within the LBA experiment.

Priority Topic 3: Mesoscale hydrometeorology:

3.1 conduct model and/or observational studies to understand the coupling between surface and boundary layer processes and convective cloud fields over the diurnal cycle;
3.2 conduct model studies to understand the influence of mesoscale changes in land cover on convective intensity and location of convective precipitation in the LBA region, and/or the response of the land surface to convective precipitation;
3.3 provide otherwise missing atmospheric and surface data that are critical to the enhance the understanding of mesoscale convective and/or land surface processes.

Priority Topic 4: Regional and continental scale surface hydrology:

4.1 develop and/or test physically based models of land surface fluxes, including streamflow, in connection with prediction of the land surface hydrologic response to seasonal-to-interannual climate variability at scales ranging from the LBA mesoscale basins to the scale of the LBA region;
4.2 demonstrate the use of remotely sensed hydrometeorological variables (possibly including precipitation and radiation) and/or remotely sensed vegetation and other land surface characteristics in connection with models of land surface fluxes, including streamflow.

Proposers should identify the specific priority topic(s) to which they are responding. Proposals without this identification or without an identifiable connection to one of the priority topics may be judged non-responsive to this NRA.

II TYPES OF ACTIVITIES TO BE FUNDED IN LBA/NH

The activities listed in this section cross-cut the priority topics detailed in Section I above. Each of these activities is relevant to most, if not all, of the priority topics. In this section approximate numbers of awards, and funding levels for each type of activity are estimated. It is anticipated that some proposals will address more than one priority topic, and most proposals will include more than one type of activity.

All research under LBA/NH will be expected to quantify errors and uncertainties associated with data, analytical approaches, and scientific interpretations.

The following types of activities are requested:

1. Synthesis of Past Work. Research to evaluate, integrate, and summarize the results of past research on surface moisture and energy fluxes relevant to LBA/NH, and the effects of forest conversion in Amazônia is needed. It is expected that most proposals will address this requirement as a component of the overall research approach, but that some proposals could offer work wholly dedicated to reviewing past work and providing a synthesis of current understanding. All such proposals must demonstrate how the review and synthesis to be provided will help address one or more of the science questions enumerated in Section III of the main body of this NRA.

NASA plans to fund approximately 0-2 new awards dedicated in part or whole to this activity

2. Modeling. Modeling is a powerful tool for interpolating and extrapolating observations and process understanding as well as for testing understanding of the modeled linkages of processes within the land and land-atmosphere systems. Proposals are requested for modeling research to: 1) identify limitations in data and/or process understanding or to generate predictions that can be used to refine the LBA-experimental design, 2) identify and resolve problem areas within specific models that may need to be addressed before they can be applied usefully to the Amazônian system, 3) capture and test understanding derived from local-scale process studies being carried out under LBA/EH, 4) scale LBA-hydrometeorology observations and understanding from local to regional (and possibly global) scales, 5) predict hydrometeorological responses based on realistic scenarios of change, and 6) model the process of land use change and predict future patterns. Models that operate at differing spatial (e.g., small catchment to continental) and temporal (minutes to decades) scales are needed. Use of measurements and process understanding to develop and validate process-oriented models of system components is needed to address the research questions relevant at both local and regional spatial scales.

All modeling proposals should describe how uncertainties in model results will be characterized and how the model will be validated. Ultimately, it will be the ability to model systems undergoing land-use change that will provide tools for both scientists and decision-makers to evaluate the potential consequences of different management practices, and to assess the consequences of policies that affect land-cover conversion. Thus, work to quantify uncertainties and validate models will be critically important in determining the utility of LBA modeling results and their successful application to sustainable development issues in Amazônia.

NASA plans to fund approximately 2-5 new awards dedicated to modeling. It is expected that other proposals to be selected may include modeling as one component of a study focused on other research activities.

3. Remote Sensing. The LBA/NH priority topics described in Section I pose questions that require satellite and airborne remote sensing data. Local, mesoscale, and Amazônia-wide geo-referenced maps of remote sensing-derived land surface, meteorological, and atmospheric properties will be produced: 1) to characterize the regional landscape and its dynamics over the time record of the satellite, 2) to help place the study sites in their correct bioclimatological and geographic context, 3) to provide local to regional scale, spatially continuous data and/or time series of data to drive and validate models, and 4) for scaling studies to integrate, interpolate, and/or extend knowledge gained at the plot level to regional scales. Proposals to undertake remote sensing work under LBA/NH will be expected to coordinate closely with PIs funded under LBA Ecology (NRA-97-MTPE-02) to assure that efforts are complementary.

Proposals are requested to provide the following basic satellite remote sensing data products: land cover type; biophysical properties of land cover; surface radiation and meteorological parameters; surface moisture properties; and topography. In some cases, algorithm refinement or modification for tropical ecosystems will be a necessary first step.

All of these proposals must include a data management plan, a validation plan, and either a data analysis component focused on addressing one or more of the Priority Topics enumerated in Section I of this Appendix or an explicit description of how it is expected that the data product will be used by other LBA-Hydrometeorology and/or Ecology participants to address one or more of these questions.

NASA plans to fund approximately 2-5 new awards dedicated to satellite and airborne remote sensing. In addition, scientists conducting on-going remote sensing research, e.g., Pathfinder and EOS instrument team member research, are encouraged to propose for participation in LBA-Ecology.

4. Field Observations and Process Studies. Generally, field activities in support of LBA hydrometeorology are being conducted under European support (LBA/EH; see http://www.ce.washington.edu/~hydro/Lettenmaier/CurrentResearch.html). However, limited field activities may be considered where they can be justified as an essential element of a strategy to scale up from the small or intermediate catchment to the Amazonia or continental scale, and/or where extension of field activities planned under other programs (e.g., LBA Ecology; TRMM validation) can be shown to be critical to the objectives of LBA Hydrometeorology activities. Investigators responding to this solicitation should propose field observations and process studies consistent with other planned field activities, but should be aware that the selected Hydrometeorology Science Team for LBA will have the opportunity to modify the finalize the final design for field activities, which will be done in conjunction with LBA-Ecology. It is also possible that decisions yet to be made by other LBA sponsors/modules may affect the final LBA-Hydrometeorology field study design as well.

NASA plans to fund approximately 2-5 awards in this area. However, NASA is not soliciting proposals that are exclusively oriented toward data collection, and it is expected awards in this area will strong elements of at least one of the other activities described in this section.

5. Synthesis and Integration. Dynamic modeling is a key tool for scaling and integration of scientific understanding, and is expected to be the focus of much of the LBA/NH activity, but it is not the only approach that might be used. Analysis of relationships among GIS and remote sensing imagery, direct calculations based on areal extent of measured or predicted fluxes, and statistical analysis are among other approaches that might be applicable. Investigations that focus on synthesizing and distilling information to answer one or more of the questions enumerated in Section I of this Appendix will be essential to the success of LBA. *Quantification of uncertainties in these integrative studies will be essential.*

NASA plans to fund approximately 0-2 new awards dedicated to synthesis and integration of newly acquired data and results as a result of this announcement.

III. ASSUMPTIONS

Proposers may make the following assumptions:

1. TRMM will make timely provision of a spatially distributed time series of precipitation with a sampling interval of 30 minutes at the site of the mesoscale field experiment for the duration of their wet season campaign for the use of investigators supported by the NASA LBA Hydrometeorology program. Discussions are ongoing with Brazilian investigators and LBA/EH to support operation of the TRMM precipitation gauge network for a period of at least 1-2 years, which would include the currently projected TRMM Rondonia validation effort during Jan-Feb, 1999.

2. All data provided by TRMM at the site of the LBA mesoscale field experiment for the duration of the wet season campaign will be freely available to investigators supported by the NASA LBA Hydrometeorology program for use in the context of the science solicited in that RA.

3. Surface flux, radiation, and meteorological observations specified in the LBA Science Plan will be installed in a timely manner, and will be funded under parallel initiatives by NASA and other US, South American and European agencies.

4. Near-surface observations of standard weather variables whose provision is supported under parallel initiatives by NASA and other US, South American and European agencies will be made freely available in real-time for assimilation into regional mesoscale and global Numerical Weather Prediction Models along with the additional remotely sensed and in situ observations collected as a result of this NRA.

5. Near-surface observations of surface energy and water fluxes whose provision is supported under parallel initiatives by NASA and other US, South American and European agencies will be made freely available to investigators supported under the NASA LBA Hydrometeorology program in a timely manner and, at the latest, within one year of their collection.

6. All of the streamflow and precipitation data routinely provided by South American agencies will be made freely available to LBA/NH investigators in a timely manner and, at the latest, within one year of their collection.

7. As indicated in Section III, the conduct of research activities sponsored by this announcement within the territory of Brazil is subject to and contingent upon approval(s) for such research activities by appropriate elements of the Brazilian Government. Proposers may assume that the necessary approvals will be obtained. But, as indicated in Section III, proposers are cautioned that this NRA is being issued and proposals are being requested prior to the receipt of formal endorsement of and approval by the Brazilian Government of these proposed research activities. NASA reserves the right to make no selections and no awards for those research activities that do not receive endorsement and approval from the Brazilian Government.

IV. DATA REQUIREMENTS

Proposers should include a specific statement of what data they will require, and how they expect it to be provided. In the event that project require data contingent on pending funding decisions, the proposer should indicate which aspects of the proposed project would be affected if the requested data were not available, and/or a backup plan that would acquire the data from alternative sources.

V. CONTENT AND EVALUATION OF STEP 1 PROPOSALS

Step 1 proposals are required of all who are interested in responding to this NRA. Step 1 proposals should include 1) a cover page (Appendix D), 2) up to 5 pages of text, single-spaced, with type no smaller than 12-pt., including abstract and references, and 3) curriculum vitae, less than 2 pages in length, for each investigator. The main text should describe concisely the research to be conducted, motivation and expected consequences, technical approach, and an estimate of cost *(what, why, how, and how much*). Signatures of authorizing officials from submitting institutions are not required for Step 1 proposals.

Step 1 proposals will be reviewed on the basis of intrinsic merit, relevance to NASA mission and objectives, and the estimated cost. The evaluation criteria, in order of decreasing importance, are:

1. Relevance and responsiveness of proposed research to this NRA
2. Scientific and technical merit
3. Estimated cost

Following the Step 1 review, NASA will place each proposal in one of the following categories:

1) *high priority* (well-conceived and innovative proposals of high programmatic relevance and high scientific and technical merit)
2) *medium priority* (relevant proposals of sound scientific and technical merit)
3) *low priority* (proposals of less relevance, and/or containing major scientific or technical deficiencies, and/or projecting high costs relative to the expected scientific returns)
4) *non-responsive/inappropriate* (proposals not relevant to this NRA, and/or with scientific or technical flaws, and/or with cost estimates exceeding resources appropriate under this NRA)

Proposers will be notified as soon as possible, but no later than March13, 1998, of the categorization of their respective proposals. Proposers of *high-priority* Step 1 proposals will be specifically encouraged to submit full proposals for Step 2. Full proposals from *medium-priority* Step 1 proposals will be acceptable. Full proposals from *low-priority* Step 1 proposals will be considered, but are discouraged. Proposers of *non-responsive or inappropriate* Step 1 proposals are strongly discouraged to submit a full proposal to this NRA. Step 2 proposals are due May 1, 1998.

VI. FORMAT AND EVALUATION OF STEP 2 PROPOSALS

Only those proposals whose objectives and methodologies have been evaluated in Step 1 will be considered. Proposals whose objectives and methodologies have changed from Step 1 will not be evaluated in Step 2.

The content of Step 2 proposals should provide sufficient detail to allow the reviewers to assess the value of the proposed research, its contribution to NASA, and the likelihood that the investigators will accomplish the stated objectives within the requested resources and schedule. Proposals that do not adhere to the format below or the stated page limitations will not be reviewed.

1. Cover Page (See Appendix D)
2. Table of contents (Paginated)
3. Project Summary (Maximum length, 1 page)
4. Technical Plan (Maximum length, 15 pages, including all figures and charts, reference cited, and schedule and data plan if applicable)
5. Management Plan (Maximum length, 1 page, for large or complex efforts involving interactions of numerous individuals or organizations)
6. Cost Plan (applicable to proposals from US institutions only; annual and cumulative budgets for no more than 3 years accompanied by justifications and explanatory notes)
7. Current and Pending Support (listing title, source, amount, and period of performance of the support received by each investigator)
8. Biographical Sketches (short vitae, listing only biographical, academic or professional essentials, and publications most relevant to the proposed research within the last 5 years)
9. Required Certifications (See Appendix E)

Additional materials may be appended only when an informed review is not possible without them; these may include accepted manuscript yet to appear in print, background on new measurements or instrumentation, or letters on collaboration by scientists or organizations from other countries.

The evaluation criteria for Step 2 proposals are described below. Criterion 1 is the most important; criteria 2 and 3 are approximately of equal weight.

1. Intrinsic merit, including scientific innovation and technical soundness in concepts and approaches, capability of the investigator(s), and the likelihood of leading to fundamental advances in knowledge and field practice.
2. Relevance and responsiveness of proposed research to this NRA
3. Realism and reasonableness of proposed cost, including its relation to resources available under this NRA

NASA may elect to support only a portion of the proposed investigation, pending successful negotiation. In cases of meritorious proposals of similar content or scope, NASA may recommend joint participation as a single project. In cases of partial or full duplication in content of an existing project or a proposal pending with another source, NASA will confer with the responsible source before a final disposition of the proposal.

VII. NON-RESPONSIVE TOPICS AND ACTIVITIES

A number of potentially relevant research topics and activities fall outside the scope of LBA/NH for one reason or another. Some of these are described below in order to provide guidance to prospective proposers.

Some research tasks relevant to LBA fall into areas to be supported either in whole or in part by other modules of LBA. These modules are currently in varying stages of development, and future opportunities for participation in these other modules are anticipated. Proposals in the Ecology component of LBA are not being sought through this NRA. Proposals for non-ground based atmospheric chemistry studies are not being sought through this NRA. All such proposals will be non-responsive to this NRA and will not be considered.

LBA/NH intends to cooperate with the NASA LBA-Ecology Project Office and LBA/EH for logistical support and the installation of infrastructure, including a data management system. Therefore, proposals for these types of support activities will be non-responsive to this NRA and will not be considered. Theoretical remote sensing science, unless it meets the criteria outlined in Appendix A, Section II.3, will be non-responsive to this NRA and will not be considered. For reasons of cost and schedule risk, development of new remote sensing instruments will be non-responsive to this NRA and will not be considered. In general, development of any new instruments will be non-responsive to this NRA and will not be considered.

Proposals for the conduct of airborne research requiring the deployment of U.S. aircraft to South America will be considered non-responsive. In addition, NASA will not take responsibility for deployment of non-U.S. aircraft to South America; proposals for such deployments will be non-responsive to this NRA and will not be considered. Investigators seeking to propose non-U.S., non-host country aircraft flights for LBA should be prepared to seek involvement in LBA through direct interactions between the two governments involved, as advised by the South American Coordinating Committee (SACC) for LBA.

VIII. LBA IMPLEMENTATION

A. Project Office

NASA will establish a Project Office at Goddard Space Flight Center for LBA-Ecology. This Project Office will be responsible for day-to-day implementation of LBA-Ecology activities. Discussions are ongoing with the Project Office to assume some aspects of implementation of LBA/NH activities as well. This would include management and coordination of resources provided to meet the scientific objectives and overall coordination of project planning, schedules, and field operations. Staff associated with the Office would bear the primary responsibility for developing the infrastructure for LBA-Ecology (and perhaps any aspects of the infrastructure that are relevant to LBA/NH activities), providing logistical support for the field studies and intensive airborne campaigns; organizing meetings and workshops of the Science Team; and implementing a data handling and distribution system for use by the Science Team. Appendix B of NRA-97-MTPE-02 describes the overall management of LBA-Ecology and the LBA-Ecology Project Office in greater detail.

B. Science Team Membership

Investigators selected to conduct research under this announcement will become members of the LBA-Hydrometeorology Science Team, which will also include Brazilian and LBA/EH investigators. LBA/NH investigators will be expected to participate fully in all Science Team meetings and activities and to budget accordingly. The LBA-Hydrometeorology Science Team will determine its own structure and method for interactions among team members, and among other elements of LBA (especially LBA/EH and LBA-Ecology) to achieve the goals of LBA-Hydrometeorology and to contribute to the overall goals of LBA.

The LBA-Hydrometeorology Science Team will bear the primary responsibility for the scientific content, direction, and priorities within LBA-Hydrometeorology. The Science Team will be responsible for finalizing the study design and research strategy; they will work with the NASA Program Manager, Ecology Project Office staff, and the NASA-Ecology and LBA/EH Science Teams to prepare a final Experiment Plan, detailing the specific activities to be conducted during the execution of the project. Additional work to strategically focus and prioritize research activities will be required of the selected Science Team for LBA/NH. They must also be prepared to coordinate and integrate their research activities under LBA/NH with activities that will be conducted under the other modules of LBA.

The LBA/NH Science Team will be expected to contribute to the establishment of a data management, data sharing, and data protocol plan across all of LBA that is consistent with participating national and agency policies and which promotes the timely publication and dissemination of scientific results. Current NASA policy does not allow for any period of exclusive use by either an individual scientist or a Science Team. Further, NASA intends to pursue a practice of timely release (i.e., as soon as is reasonably possible) for public access to data within the overall LBA partnership. Ultimately, investigators selected in response to this LBA/NH NRA will be expected to comply with the data policies and practices established by LBA.

Investigators interested in providing leadership in the early implementation of LBA/NH and assisting the Project Scientist are requested to indicate their interest on the cover page of the proposal. Those indicating such an interest may be called upon to help organize the first Science Team meeting and other preparatory activities.

C. Schedule and Priorities for LBA-Ecology and LBA/EH

The current plan for LBA-Ecology is to select field sites, begin installing towers and field research facilities, and start *in situ* data collection in early 1998 or as soon thereafter as approvals have been granted by the host country. It is envisioned that some sites and measurement capabilities may be implemented earlier than others and that it might take 1-2 years to get all LBA-Ecology activities underway. In general, once a field study begins operations, it will be expected to continue in place for at least 3 years. Obviously there will be exceptions to this duration, depending on the type of work proposed, and opportunities for investigations to change sites, but a major goal for this study is to assemble a 3-5 year

core data set to answer the research questions posed.

Initial non-field research will focus on work that synthesizes data and/or results from past studies, assembles priority satellite and ancillary data sets, and exercises relevant ecosystem models to improve the research design. Research activities such as these, that do not require new field data, will be initiated as soon as possible after the LBA-Ecology selection is announced.

As of this writing, the highest priority for early LBA/Ecology implementation and operational capability in the field will be placed on those investigations required to establish one tower cluster, with a full complement of ecological and biogeochemical process studies, on each transect and to establish a core of land cover and land use change investigations. Next in priority for the LBA-Ecology field activities will be establishing a robust complement of observational and process studies at secondary sites, conducting additional studies of the factors controlling land use change, and adding towers, with complementary process studies, to complete at least one transect. Next in priority would be to complete both transects and enhance, from the bare minimum, the extensive, auxiliary site measurements. Also of high priority will be getting in place the field investigations and atmospheric monitoring that must start a year in advance of the Atmospheric Chemistry module's TRACE-B airborne campaign so as to facilitate the planning and scheduling of that module.

D. Duration of Projects

Proposers to this announcement are advised to offer a six-year commitment to research within LBA, but to only propose a detailed plan for 3 years of work, starting on or after June 1, 1998. Proposals for shorter periods are welcome. Annual progress reports, to be reviewed internally, will be required. NASA intends to request continuation proposals, to be subject to full external peer review, for a 3 year or less period of performance during 2001-2003. It is anticipated that many of the original investigations will be successfully renewed in 2001, but that there also will be some turnover, opportunities for new investigators to propose, and probably opportunities for new questions to be addressed. Annual reporting and internal review will be required during this second performance period as well. In addition, if the need arises, resources permit, and host country approvals can be obtained, NASA may open LBA/NH to new investigations, including those requiring deployment of U.S. aircraft, through other future research announcements.

The above plan and schedule are, of course, entirely dependent on the implementation of appropriate agreements between the U.S. and Brazil and on the receipt of any other required approvals from host countries.

E. Use of U.S. Aircraft

The process for obtaining approvals to fly foreign aircraft in Brazil, and potentially other South American countries, is lengthy and complex. It is not always certain that approvals will be granted -- especially for sensitive sites or certain types of sensors. Detailed information about the aircraft and their payloads is often required at least a year in advance,

and many internal legal requirements must be addressed. For these reasons, research requiring non-Brazilian (or non-host country) aircraft is not being solicited at this time, with the exception of aircraft-based data acquisition already planned under TRMM land validation activities. However, research to make *in situ* or remote sensing observations utilizing host country aircraft may be proposed in response to this NRA. NASA may propose use of U.S. aircraft in LBA at a later date. Only after approval to proceed is granted by Brazil, would NASA request and fund research on U.S. aircraft for LBA-Ecology.

NASA is interested in receiving information about what types of airborne science to be conducted on U.S. aircraft platforms are of interest to the LBA hydrometeorological research community and might be proposed in response to a future announcement for LBA. Thus, letters describing interest in U.S. aircraft deployment(s) to South America for research relevant to the goals and objectives of LBA/NH are requested. Such expressions of interest should describe the scientific research that could be conducted, the instrument(s) to be used, the required U.S. aircraft platform(s), and the desired timing for a deployment(s) to South America. The information received will be used for planning and informational purposes only. No commitments or awards will be made in response to these letters of interest.

In all cases, investigators proposing aircraft work are expected to comply with all host-country laws and recommended procedures.

IX. OPPORTUNITIES FOR CURRENTLY FUNDED RESEARCH PROJECTS

1. On-going Investigations in Amazônia and EOS Interdisciplinary Investigations. Scientists who are already conducting research in Amazônia that is consistent with the goals and/or scope of LBA/NH are encouraged to propose in response to this announcement at no cost or at low cost (e.g., for travel funds to attend Science Team meetings or to facilitate collaborations) in order to become members of the Science Team and participate in its activities. Such proposals may consist of a cover letter indicating the scientist's interest in LBA and describing the particular research tasks to be pursued, a copy of the proposal that has already been funded, and some indication that the proposed work is already funded and participation in LBA is acceptable to the funding sponsor. Host country collaborators and institutions should be named in the cover letter. A full, new proposal need not be written. Such proposals will be evaluated along with all other proposals submitted in response to this announcement, but in a special category. No-cost and low-cost proposals selected for funding will be awarded under the same general conditions as the other proposals solicited under this NRA; performance periods will be awarded to match the duration of the on-going investigation as long as they do not exceed an initial 3 year performance period.

EOS Interdisciplinary investigators conducting research in Amazônia or conducting modeling studies that could be enhanced through collaboration with LBA/NH are invited to propose in this same way for participation in LBA.

2. Satellite Instrument Team Members. Due to its timing and the nature of the data to be collected, LBA will provide a unique opportunity to combine a major field campaign with evaluation of the performance of and data products from several new satellite sensors. The airborne remote sensing campaign(s) that may be proposed at a future date, as well as some of the *in situ* and light aircraft-based observations that may occur throughout the duration of LBA, represent excellent opportunities for evaluation of data from EOS AM - 1, Landsat 7, TRMM, or other new satellites. Science team members for these instruments or others who are responsible for their evaluation are invited to consider using the LBA region as a test site and cooperating with LBA/NH as a means of evaluating algorithms and data products. This invitation is not to be construed as an opportunity to re-define the goals or experimental design of LBA, but rather as an opportunity to influence the details of the planning so as to maximize LBA's usefulness for new satellite data evaluation. LBA scientists, of course, will be most interested in making use of these new data sets to help answer the questions they have tackled.

The TRMM Project is coordinating its field validation efforts with LBA. TRMM scientists involved in the planning and execution of this activity are likely to receive NASA sponsorship for their participation through TRMM, and, therefore, need not propose in response to this opportunity, unless specific activities of benefit to LBA/NH that go beyond TRMM re involved.

Scientists interested in participating in LBA/NH for the purpose of satellite data evaluation are encouraged to propose in response to this announcement at no cost in order to become members of the LBA Hydrometeorology Science Team. Such proposals should take the same form and will be selected for awards as specified in Section IX-1 above. A full, new proposal need not be written.

X. COLLABORATIONS

1. General. Proposers are encouraged to develop appropriate collaborations of all kinds. Combinations of U.S. and international scientists are encouraged, as are collaborations among scientists from government, industry, and academia.

Joint, collaborative proposals are welcome, as are parallel proposals for complementary activities. Proposers are cautioned to not create so broad or diffuse a collaboration that reviewers cannot evaluate the proposal at a reasonable level of technical detail or understand its management plan. Proposers are encouraged to note linkages among proposals being submitted in parallel, but are cautioned to not create critical dependencies on other proposals such that each cannot be evaluated as a separable unit of research. There will be many opportunities to pursue additional collaborations once the LBA Hydrometeorology Science Team is selected.

2. Host Country Collaborations. Brazilian law requires that scientists from outside of Brazil participating in expeditions within Brazil have a Brazilian counterpart. A Brazilian institution with recognized expertise in the research area must take responsibility for the participation of the foreign investigators. For this reason, as well the obvious importance of involving scientists with needed expertise and familiarity with the local environment, proposers are strongly encouraged to involve Brazilian and/or other host country

collaborators (e.g., scientists, students, and technicians) in their responses to this announcement. *Proposers should provide evidence that they have taken appropriate measures to facilitate the involvement of their host country collaborators.*

Proposals without host country collaborations will be considered responsive to this announcement, but if accepted, will be accepted for a one year definition phase pending identification of a host country counterpart or some other arrangement acceptable to the host country. One of the planned responsibilities of the South American Coordinating Committee (SACC) for LBA is to help match foreign participants with appropriate host country collaborators. If, at the end of this one year definition phase, an acceptable collaboration has been identified, the award will be confirmed for an execution phase under the same terms as proposals selected without a definition phase. If an acceptable collaboration has not been identified at the end of one year, the award will be allowed to expire at the end of its initial performance period.

Proposers are referred to the 1993 Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) publication on *International Cooperation: Scientific Expeditions* (CNPq, 1993) for further guidance on Brazilian laws concerning international scientific expeditions (see Appendix F for LBA Home Page URL). It is possible that the official agreements that NASA will pursue with Brazil may affect the details of how such collaborations are developed and recognized, but the specifics of such arrangements cannot be anticipated at this time. Discussions concerning the involvement of other Amazônian countries are at a very early stage. Investigators who propose to work in the Amazon outside of Brazil will be expected to comply with all host country requirements.

Compliance with all applicable host country laws, regulations, policies, and procedures will be required of all LBA participants.

APPENDIX B

INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS (JANUARY 1997)

(a) **General**.

(1) Proposals received in response to a NASA Research Announcement (NRA) will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a pre-award synopsis published for individual proposals.

(2) A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

(3) NRAs contain programmatic information and certain requirements which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which applies to responses to all NRAs.

(4) A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate instrument. Contracts resulting from NRAs are subject to the Federal Acquisition Regulation and the NASA FAR Supplement. Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1).

(5) NASA does not have mandatory forms or formats for responses to NRAs; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

(6) To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

(b) **NRA-Specific Items**. Several proposal submission items appear in the NRA itself: the unique NRA identifier; when to submit proposals; where to send proposals; number of copies required; and sources for more information. Items included in these instructions may be supplemented by the NRA.

(c) The following information is needed to permit consideration in an objective manner. NRAs will generally specify topics for which additional information or greater detail is

desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

(1) **Transmittal Letter or Prefatory Material**.

(i) The legal name and address of the organization and specific division or campus identification if part of a larger organization;

(ii) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;

(iii) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;

(iv) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;

(v) Identification of other organizations that are currently evaluating a proposal for the same efforts;

(vi) Identification of the NRA, by number and title, to which the proposal is responding;

(vii) Dollar amount requested, desired starting date, and duration of project;

(viii) Date of submission; and

(ix) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

(2) **Restriction on Use and Disclosure of Proposal Information**. Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

Notice
Restriction on Use and Disclosure of Proposal Information

The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal the Government shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

(3) **Abstract**. Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

(4) **Project Description**.

(i) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance; relation to the present state of knowledge; and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(ii) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

(5) **Management Approach**. For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

(6) **Personnel**. The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

(7) **Facilities and Equipment**.

(i) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(ii) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non-research purposes should be explained.

(8) **Proposed Costs**.

(i) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages; fringe benefits; equipment; expendable materials and supplies; services; domestic and foreign travel; ADP expenses; publication or page charges; consultants; subcontracts; other miscellaneous identifiable direct costs; and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

(ii) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired; purpose and estimated number and lengths of trips planned; basis for indirect cost computation (including date of most recent negotiation and cognizant agency); and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.

(iii) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831 (and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

(9) **Security**. Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

(10) **Current Support**. For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

(11) **Special Matters**.

(i) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.

(ii) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

(d) **Renewal Proposals**

(1) Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal

proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

(2) NASA may renew an effort either through amendment of an existing contract or by a new award.

(e) **Length**. Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

(f) **Joint Proposals**.

(1) Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

(2) Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

(g) **Late Proposals**. A proposal or modification received after the date or dates specified in an NRA may be considered if doing so is in the best interests of the Government.

(h) **Withdrawal**. Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

(i) **Evaluation Factors**

(1) Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

(2) Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

(3) Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

(i) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(ii) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.

(iii) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(iv) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

(4) Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

(j) **Evaluation Techniques**. Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

(k) **Selection for Award**.

(1) When a proposal is not selected for award, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

(2) When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

(l) **Cancellation of NRA**. NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.

APPENDIX C

GUIDELINES FOR FOREIGN PARTICIPATION

NASA accepts proposals from entities located outside the US in response to this NRA. Proposals from non-US entities should not include a cost plan as they are made on a no-exchange-of-funds basis. Non-US proposals, and US Proposals that include non-US participation, must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the non-US participant is proposing. Such endorsement should indicate the following points: (1) The proposal merits careful consideration by NASA; and (2) If the proposal is selected, sufficient funds will be made available by the sponsoring foreign agency to undertake the activity as proposed.

Proposals, along with the requested number of copies and Letter of Endorsement must be forwarded to NASA in time to arrive before the deadline established for this NRA. In addition, one copy of each of these documents should be sent to:

NASA Headquarters
Office of External Relations
Mission to Planet Earth Division, Code IY
Washington, DC 20546
USA

Any materials sent by courier or express mail should include the street address 300 E Street, S. W., and substitute 20024 for the indicated ZIP code.

All proposals must be typewritten in English. All non-US proposals will undergo the same evaluation and selection process as those originating in the US. Non-US proposals and U. S. Proposals that include non-US participation, must follow all other guidelines and requirements described in this NRA. Sponsoring non-US agencies may, in exceptional situations, forward a proposal without endorsement to the above address, if review and endorsement are not possible before the announced closing date. In such cases, however, NASA's Mission to Planet Earth Division of the Office of External Relations should be advised when a decision on the endorsement is to be expected.

Successful and unsuccessful proposers will be contacted directly by the NASA Program Office coordinating the NRA. Copes of these letters will be sent to the sponsoring government agency.

Appendix D

Proposal Cover Page
Hydrometeorological Participation in LBA (NRA 98-MTPE-01)

Proposal No. _____ (Leave Blank for NASA Use)

Title: _____

Principal Investigator:

Name: _____

Department:_____

Institution: _____

Street/PO Box: _____

City: _____ State: _____ Zip: _____

Country: _____ E-mail: _____

Telephone: _____ Fax: _____

Co-Investigators:
Name/Institution/Telephone/email

_____

_____

_____

Priority topics
____ 1. Global scale hydrometeorology
____ 2. Continental and regional scale hydrometeorology
____ 3. Mesoscale hydrometeorology
____ 4. Regional and continental scale surface hydrology

Budget:

Year 1 _____ Year 2 _____ Year 3 _____ total _____

Requested Start Date: _____ **Requested Duration**: _____

Authorizing Official: _____ _____
(Name) (Institution)

Appendix E

Certification Regarding
Debarment, Suspension, and Other Responsibility Matters
Primary Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 34 CFR Part 85, Section 85.510, Participant's responsibilities. The regulations were published as Part VII of the May 26, 1988 Federal Register (pages 19160-19211). Copies of the regulation may be obtained by contracting the U.S. Department of Education, Grants and Contracts Service, 400 Maryland Avenue, S.W. (Room 3633 GSA Regional Office Building No. 3), Washington, DC. 20202-4725, telephone (202) 732-2505.

(1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statues or commission of embezzlement theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

(d) Have not within three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Organization Name PR/Award Number or Project Name

Name and Title of Authorized Representative

Signature Date

ED Form GCS-008 (REV.12/88)

Appendix E

Certification Regarding Drug-Free Workplace Requirements
Grantees Other Than Individuals

This certification is required by the regulations implementing the Drug-Free Workplace Act of 1988, 34 CFR Part 85, Subpart F. The regulations, published in the January 31, 1989 Federal Register, require certification by grantees, prior to award, that they will maintain a drug-free workplace. The certification set out below is a material representation of fact upon which reliance will be placed when the agency determines to award the grant. False certification or violation of the certification shall be grounds for suspension of payments, suspension or termination of grants, or governmentwide suspension or debarment (see 34 CFR Part 85, Sections 85.615 and 85.620).

This grantee certifies that it will provide a drug-free workplace by:

(a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(b) Establishing a drug-free awareness program to inform employees about -

(1) The dangers of drug abuse in the workplace;
(2) The grantee's policy of maintaining a drug-free workplace;
(3) Any available drug counseling, rehabilitation, and employee assistance programs, and
(4) The penalties that may be imposed upon employees for drug abuse violations in the workplace;

(c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);

(d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will -

(1) Abide by the terms of the statement; and
(2) Notify the employer of any criminal drug statute conviction for a violation occurring in the workplace no later than
five days after such conviction;

(e) Notifying the agency within ten days after receiving notice under subparagraph (d)(2) from an employee or otherwise receiving actual notice of such conviction;

(f) Taking one of the following actions, within 30 days of receiving notice under subparagraph (d)(2) , with respect to any employee who is so convicted -

(1) Taking appropriate personnel action against such an employee, up to and including termination; or
(2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved
for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;

(g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraph (a), (b), (c), (e), and (f).

Organization Name PR/Award Number or Project Name

Name and Title of Authorized Representative

Signature Date

ED 80-0004

Appendix E

CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements.

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000, and not more than $100,000 for each such failure.

_____

Signature and Date

_____

Name and Title of Authorized Representative

_____

Organization Name

APPENDIX F

ELECTRONIC ADDRESSES

The URL references listed below are available for on-line access via the following World Wide Web Home-Pages:

(1) NASA MTPE Home Page (this NRA, the Manaus Workshop Report, the Remote Sensing
Workshop Report, the MTPE Science Plan):

http://www.hq.nasa.gov/office/mtpe/

(2) mirror of LBA Home Page at ORNL (for LBA Concise Experimental Plan and any preparatory
data sets that may have been released, CNPq guidelines for foreign participation, etc.):

http://www-eosdis.ornl.gov/lba_cptec/

To minimize excess traffic at the INPE Home Page: if you are outside of South America., please use this mirror site primarily!

(3) LBA Home Page at CPTEC, INPE:

http://yabae.cptec.inpe.br/lba

(4) ORNL Amazon Home Page (for bibliography and a variety of background information,
including a link to the mirror of the LBA Home Page):

http://www-eosdis.ornl.gov/LBA/misc_amazon.html

(5) EOS Project Science Office Home Page (for background on satellite missions):

http://eospso.gsfc.nasa.gov/

(6) US Global Change Research Program (GCRP)

http://www.gcrio.org

(7) European-funded hydrometeorological actvities (LBA/EH)

http://www.ce.washington.edu/~hydro/Lettenmaier/CurrentResearch.html

(8) Tropical Rain Measuring Mission (TRMM)

http://mentor.eorc.nasda.go.jp/TRMM
http://trmm.gsfc. nasa.gov/trmm_office/index.html)